similar way the crystals which it would throw down. But this must be left to the petrologists. I cannot, however, express too strongly my appreciation of the value of Lord Kelvin's stalwart opinion respecting the incompetency of the thermal theory of crustal deformation, since this carries with itself, more remotely and occultly (*pace* Kelvin) an implication of like weakness in the theory of the white-hot earth itself.

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*A DANGEROUS EUROPEAN SCALE INSECT NOT HITHERTO REPORTED, BUT ALREADY WELL ESTABLISHED IN THIS COUNTRY.**

In view of the activity and zealousness displayed by several of the European states in excluding American plants and fruits on the pretext of possible contamination with the San José scale, it is opportune perhaps to call attention to the fact that a dangerous and perhaps very dangerous European scale insect, *Aspidiotus ostreæformis* Curtis, has recently become well established in this country. This scale insect is very similar to the San José scale in general appearance and habit, and is liable to be almost, if not equally, as mischievous, judging from the examples of badly infested material which have come to this office for determination.

Aspidiotus ostreæformis is a well-known pest on various fruit trees in Europe, where it has a very wide distribution, but, strangely enough, in view of the ease of its importation on nursery stock, seems not to have gained lodgment in this country until comparatively recently. The first examples of *ostreæformis* coming to this office from American sources were naturally confused with other species, being identified either as *ancylus*, *juglans-regiæ* or *forbesi*, all near allies; and while *ostreæformis* has undoubtedly been established in New York and Ohio for eight or ten years, and in other localities for shorter periods perhaps, its existence in this country has not hitherto been reported in print, and specific identification has only been established within the last year. In fact, so little is the species known that two experts in Coccidæ were prepared recently to describe as new an example, referred to below, coming to Dr. James Fletcher from Pocum, British Columbia. The fact that this material represented the European *ostreæformis*, now first shown to occur in this country, was fortunately determined by Mr. Theo. Pergrande in time, I believe, to prevent the publication of the new species.

Within the last few months material representing *ostreæformis* has come to this office and been determined by the writer very frequently, especially from the State of New York, where it seems to have become well established, notably in the vicinity of Geneva. No less that 15 lots of this scale insect have been determined from Geneva, N. Y., representing as food plants plum, cherry and apple. Most of this material has been communicated by Mr. G. G. Atwood, either direct or through Mr. Felt. In one case the food plant is designated as 'European plum,' and the statement is made by Mr. Atwood that the scale occurs in numbers on this food plant, to its considerable injury. Additional localities in New York are: Rochester, on apple (H. C. Peck and V. H. Lowe); same locality, on plum (Dr. Peter Collier), and Millbrook, on pear (E. C. Butterfield, reported as badly infesting 7 pear and 12 plum trees imported eight years before from a German firm); Penfield, on apple (Felt); and also

* The scale insect on pear and apple at Alameda, Cal., collected by Mr. Koebele and determined by Professor Cockerell as *ostreæformis* (Bul. 6, Tech. Ser., Div. Ent., U. S. Dept. Agric., p. 19.), is a case of wrong identification; the species is *juglans-regiæ*, as I have determined from examination of the original material.

from New York State without locality (Felt).

Two localities in Ohio have furnished this scale insect, namely, Wooster, on plum, (F. M. Webster), and Cleveland, on pear (J. A. Stevens). One locality is represented in Michigan, namely, South Haven, on apple, communicated by W. B. Barrows.

In Canada the scale occurs on prune at Pocum, British Columbia (J. Fletcher), and on plum at Niagara, Ont. (Joseph Healey).

A careful examination has been made of all material received at this department representing allied species or those with which there was any possibility of confusion with *ostreæformis*, with the result of the discovery of some half a dozen examples of the latter species. The material earliest received referable to *ostreæformis* bears date of January 12, 1895, and was communicated by Dr. Peter Collier, of the Agricultural Experiment Station at Geneva, N. Y. It was reported as occurring on plum near Rochester, and was identified at that time as *ancylus*, perhaps its nearest American ally. In the same year, April 3, 1895, specimens on plum were received for identification from Mr. F. M. Webster, Wooster, O., and were also referred to *ancylus*. No additional material of this species was received until 1897; in that year Professor W. B. Barrows sent it from South Haven, Mich., and the insect was doubtfully identified as *ancylus*. During 1898 it was received from several localities, as follows: Cleveland, O., on pear; Millbrook, N. Y., on pear; Geneva, N. Y., on plum; British Columbia, on prune, and Niagara, Ont., on plum. In 1899 it was received many times, principally from Geneva. N. Y., and also from Rochester and Penfield, as noted. Its origin on European stock is plainly indicated; possibly the original importation occurring about 1890, although perhaps earlier.

The writer has made mounts and careful studies of this insect from various European localities, and has determined that Signoret's species, *Aspidiotus spurcatus*, is a synonym of *ostreæformis*, and that *A. zonatus* Frauenf., is also probably a synonym, or, perhaps, a mere variety of the same species.

The European localities from which the writer has examined specimens of this scale insect are as follows:

Geisenheim, Germany, on apple, communicated by Dr. L. Reh, Station fur Pflanzenschutz, Hamburg; Isle of Langenau, Nackenheim, Rheinhessen, Germany, on pear sent by Dr. J. Ritzema Bos; Stettin, Prussia, on apple, collected by Mr. Theo. Pergande in July, 1898, 'rather scarce'; Wanganingen, Holland, on pear, sent as probably *perniciosus* by Dr. J. Ritzema Bos; Prague, Bohemia, on *Prunus domestica*, from Mr. K. Sulc; Chester, England, on plum, communicated by Mr. Robert Newstead and labelled as determined by Mr. J. W. Douglas; Florence, Italy, on *Populus tremuloides*, determined as *Aspidiotus spurcatus* (Cherm. It., Fasc. I., No. 3); Italy on *Platanus orientalis*, determined as *Aspidiotus spurcatus* (Cherm. It., Fasc. I., No. 5). On May 19th also, of this year, this scale was found associated with a *Mytilaspis* sp., on cuttings of date palm collected for the Department in Algeria by Mr. Walter T. Swingle.

The species was originally described by Mr. Curtis from pear in England. Mr. J. W. Douglas reports it also in England on plum, pear, apple and cherry, and Mr. A. C. F. Morgan gives the additional food plant, *Caluna vulgaris*, in Portugal, finding it associated with *Mytilaspis pomorum*. On the continent of Europe it has been variously reported as affecting the fruit trees mentioned above.

Aspidiotus zonatus was originally described from specimens found on oak in Vienna. The females occur for the most part on the bark; the males on the leaves. It is widely distributed in Europe. The Department

collection contains specimens from Chester, England (Newstead); and on the white oak from Stettin, Prussia (Pergande).

Aspidiotus spurcatus has been reported from France and Italy on poplar and Platanus.

It will be noted that the Department and other records exhibit not only a wide range of food plants, but a very extended distribution in Europe, both geographically and as to climate. This scale insect, therefore, seems to be one well worthy of attention and one that will bear watching. It is to be hoped that it will not be as disastrous to our fruit interests as have been other foreign scale insects imported to our shores.

C. L. Marlatt.

U. S. Department of Agriculture.

Note: After returning the proof of the above to Science, part of the type material of a supposed new species of *Aspidiotus* (*A. hunteri*), found in 1897 on currant at Alton, Iowa, was sent to this department by the describer of the species, Mr. Wilmon Newell, Assistant Station Entomologist, Iowa Experiment Station. The material in question proves to belong to *ostreæformis*, and is very interesting as showing the occurrence of this species so far west and also as indicating a new food plant.

CROSS-EDUCATION.

The term 'cross-education' is used to express the theory that the effects of practice on one side of the body are transferred to the unpracticed side. The subject has been investigated during the past year at the Yale Psychological Laboratory in the effort definitely to establish the fact of transference of practice and to arrive at an explanation of the causes of such transference. Following is a brief summary of the experiments carried on and the results obtained from them:

a. Rapidity of voluntary effort.—A tap-counter was constructed from clock-work and connected electrically with a telegraph key. At each pressure of the key by the hand or the foot the counter registered one tap. Records of maximum rapidity of tapping were taken for right and left index fingers and right and left great toes separately. Then for two weeks the right great toe alone was practiced in tapping daily for a considerable time. Then all four digits were tested as at the start. The result for six subjects showed that the average relative gain for the right great toe—the member practiced—was 31%; for the left great toe, 30%; for the right index finger, 20%; for the left index finger, 28%. The last three had, therefore, gained by practice of the first.

b. Strength of voluntary effort.—Six subjects were tested as to the number of times they could raise a dumb-bell weighing $2\frac{1}{4}$ kilos (5 lbs.). Girth measurements of the right and left arms were taken and the dynamometric pressure of each hand was determined. For two weeks the right arm alone was exercised in raising the dumb-bell. Results: (1) The average gain of the right arm in the number of flexions made was 470%; of the left arm, 150%. (2) The average gain in the girth of the right biceps was $6\frac{1}{3}$ mm.; of the left biceps, $2\frac{5}{6}$ mm.; of the right forearm, $4\frac{5}{6}$ mm., and of the left forearm, $2\frac{1}{6}$ mm. (3) The average dynamometric pressure increased in the right hand 13%, in the left 13%. (4) Practice of the *right* arm inured *both* arms to resist the after-effects of violent exercise as revealed by stiffness, pain and soreness. These experiments proved not only the fact of cross-education in ability to do work, but also the fact of cross-development, in a lesser degree, of the symmetrical muscles.

c. Accuracy of voluntary effort.—A target was so devised that permanent records of accuracy in lunging with a fencer's foil could be obtained. Records of both right and left hands were secured with six subjects. The lunging was then practiced for two weeks with the right hand only. Thereafter both hands were tested. Results: (1) Both hands had gained in accuracy,